said flexible graphite sheet comprises a sufficient amount that said device is dense and cohesive but said resin content comprises less than 30% by weight.

Please add new claims 21 and 22 as follows:

--21. The resin/graphite laminate of claim 1 wherein said resin content comprises no more than 20% by weight.

22. The resin/graphite laminate of claim 1 wherein said resin content comprises no more than 25% by weight.--

REMARKS

The Applicants respectfully request reconsideration in view of the amendment and the following remarks. The Applicants have amended the specification as suggested by the Examiner. Support for the amended claims can be found on page 11, line 31- page 12, line 5 of the specification. Support for newly added claims 21 and 22 can be found on page 11, line 31- page 12, line 5 of the specification. Claims 1-15 and 17-22 are now pending. Claim 16 has been canceled without prejudice or disclaimer.

PRIOR ART REJECTIONS

The Examiner rejected claims 1-3, 6-8, and 10 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 3,404,061, referred to as Shane et al. by the Examiner. The Examiner also rejected claims 4-5, 9, 11-16, and 17-20 under 35 U.S.C. § 103(a) as being unpatentable over Shane et al.

Applicants have amended independent claims 1, 6, 10, and 17 to include the following limitation "wherein a resin content of at least one of said flexible graphite sheet comprises a sufficient amount that said laminate/device is dense and cohesive but said resin content comprises less than 30% by weight." This limitation is not disclosed by the reference. In light of this, Applicants request that the Examiner withdraw the above 102(b) rejection of the above claims based on the reference.

As for the rejection based on 103(a), the invention of claim 17 is patentable over the reference for the reason that the resin-impregnated flexible graphite sheets of the claimed invention has one or more properties which are superior to that of the Shane et al. reference which were unexpected. These properties include at least the in-plane thermal conductivity of the flexible graphite laminate, the mechanical strength of the laminate, and the Young's modulus of the laminate.

With respect to the thermal conductivity, the resin-impregnated sheets of flexible graphite has an in-plane thermal conductivity of greater than 300 W/mC (reported in example 1 as 396 W/mC). In comparison, attached pages 11 and 17 of volume one of the GRAFOIL® Engineering Design Manual reports that the in-plane thermal conductivity of GRAFOIL® flexible graphite sheet is 140 W/mC. Thus the inventive flexible graphite sheet has an in-plane thermal conductive of over twice as great as that of the flexible graphite sheet provided by the assignee of the Shane et al. reference, reported in 1987. The attached documents are incorporated herein by reference.

Regarding the mechanical strength, the inventive resin-impregnated flexible graphite sheet has a flexural strength (tensile strength) of 8000 psi, *see* example 1. In table II of the Shane et al. reference, the tensile strength of the graphite sheet is reported as 450 to 3200 psi. In the aforementioned reference regarding GRAFOIL®, the tensile strength is reported 650 to 750 psi or 5.2 MPa. The tensile strength of the inventive resin-impregnated flexible graphite sheet is

at least twice as great as that of the reference and in many instances more than an order of magnitude higher than that of the reference.

As for the Young's Modulus, the inventive resin-impregnated flexible graphite sheets has a modulus of 7.5×10^6 psi, *see* example 1. In the Shane et al. reference the Young's modulus is reported as $0.184\text{-}0.555 \times 10^6$ psi. In the GRAFOIL® Manual, the Young modulus is reported as 2.0×10^5 psi. Thus, the Young's modulus of the inventive flexible graphite sheet is a factor of 10 higher than that of the reference.

Applicants state that claim 17 is unobvious over the Shane et al. reference because the claimed invention has at least one property that is unexpectedly superior to that of the reference. For instance, the in-plane thermal conductivity is more than twice that of the reference, the mechanical strength of the claimed invention is more than twice that of the reference, and the Young's modulus of the claimed invention is at least a factor of 10 higher than that of the reference. For the above reasons, the Applicants request that the Examiner withdraw the rejection based on 103(a) in light of the above amendments and remarks.

Though not believed necessary by Applicants, Applicants hereby request any appropriate extension to make this response timely and authorize the payment of any associated fee, such as the payment for an additional dependent claim. If there are any additional fees due in connection with the filing of this response, including any fees required for an additional extension of time under 37 C.F.R. 1.136, such an extension is requested and the Commissioner is authorized to charge or credit any overpayment to Deposit Account No. 50-1202.

For the reasons set forth above, Applicants believe that the claims are patentable over the references cited and applied by the Examiner and a prompt and favorable action is solicited. The applicants believe that these claims are in condition for allowance, however, if the Examiner disagrees, the applicants respectfully request that the Examiner telephone the undersigned.

Respectfully submitted,

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Marked Up Version Sh wing Changes

IN THE SPECIFICATION

Please replace the paragraph starting on page 2, line 4 with the following:

-- In addition to their utility in gasket materials, graphite laminates also find utility as heat transfer or cooling apparatus. The use of various solid structures as heat transporters is known in the art. For example, Banks, U.S. Patents 5,316,080 and 5,224,0930 discloses the utility of diamonds and gas-derived graphite fibers, joined with a suitable binder, as heat transfer devices. Such devices are employed to passively conduct heat from a source, such as a semiconductor, to a heat sink. --

IN THE CLAIMS

Please amend the following claims 1, 6, 10, 16, and 17 as follows:

1(amended). A resin/graphite laminate comprising multiple sheets of resin impregnated flexible graphite pressure cured at an elevated temperature, wherein a resin content of at least one of said flexible graphite sheet comprises a sufficient amount that said laminate is dense and cohesive but said resin content comprises less than 30% by weight.

6(amended). A resin/graphite laminate comprising layers of resin impregnated flexible graphite sheets together with layers of a non-graphite material, wherein the laminate is pressure cured at an elevated temperature, wherein a resin content of at least one of said flexible graphite sheet comprises a sufficient amount that said laminate is dense and cohesive but said resin content comprises less than 30% by weight.

10(amended). An electronic thermal management device comprising a lamellar structure comprising sheets of resin impregnated flexible graphite pressure cured at an elevated

temperature, wherein a resin content of at least one of said flexible graphite sheet comprises a sufficient amount that said device is dense and cohesive but said resin content comprises less than 30% by weight.

16. ~~The electronic thermal management device of claim 10 wherein the sheets of flexible graphite have a resin content of from about 5% to about 35% by weight.~~

17(amended). An anisotropic electronic thermal management device having a thermal conductivity of greater than about 300 W/mC in an in plane direction and a thermal conductivity of less than about 10 W/mC in an out of plane direction and comprising resin impregnated sheets of flexible graphite, wherein a resin content of at least one of said flexible graphite sheet comprises a sufficient amount that said device is dense and cohesive but said resin content comprises less than 30% by weight.